FLATLANDERS IN THE 21ST CENTURY: ORGANIZATIONAL COMPRESSION IN THE INFORMATION AGE

A Monograph
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ABSTRACT

FLATLANDERS IN THE 21st CENTURY: ORGANIZATIONAL COMPRESSION IN THE INFORMATION AGE by MAJ Charles G. Heiden, USA, 79 pages.

This monograph examines a portion of how the Army fights with a smaller force and fewer supporting resources at the operational level. A possible way to employ scarce resources comes from centralizing critical resources and connecting them through information systems. These small, separate organizations operate with a core of full time employees and the ability to network into a much larger company.

The monograph will look at traditional and virtual organization use in military and civilian organizations. First, this monograph explains the primary staff functions in a corps headquarters or a Joint Task Force (JTF). Next, an examination of recent business literature provides the theoretical basis of virtual organizations. Last, some proposed criteria show a way to measure corps/JTF staff operations for adaptability to virtualness. This will allow recommendation of staff positions or functions to become virtual modules.

Extensive use of computers and information systems to distribute this knowledge within a corps can only represent a gain in efficiency. Faster and more open distribution allows subordinate commanders and their staffs access to raw intelligence or operational products that affect their areas. Consequently, this may provide a significant gain in satisfaction for the commander and his subordinate unit commanders.

It is technologically feasible to add virtual modules to the Army corps or even a multi-service joint task force staff. These modules multiply the capabilities of the present staff structure. Evolutionary application of this capability to the old organizational structure does not exploit a force's ability to adapt. Commanders must continue to consider the desired results and success criteria. Technology can allow a force to dominate a battlefield, but success still relies on the interpersonal action of people and their analysis and belief about their current situation.

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TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

> "*I.* Alas! How shall I make it clear? When you move straight on, does it not sometimes occur to you that you *could* move in some other way, turning your eye round so as to look in the direction towards which your side is now fronting? In other words, instead of always moving in the direction of one of your extremeties, do you never feel a desire to move in the direction, so to speak, of your side?
>
> *King.* Never. And what do you mean? How can a man's inside 'front' in any other direction? Or how can a man move in the direction of his inside?"[1]

Problem Background and Significance

In the transition from Industrial Age to Information Age, the Army must be aware of civilian developments.[2] During the Industrial Age, business remained focused on the production of physical goods.[3] The marketplace remained open and relatively stable as the process of manufacture became the focus of scientific study. By the late 1970s a change in the marketplace came about as economies became more interdependent and information became more important.[4]

Service and manufacturing sector businessmen began changing from strictly hierarchical organizations in the middle 1980s toward task and functional based structures. This altered structure came from a market forcing faster innovation as competitors found higher levels of expertise available without having to own a research organization. Initially, companies formed internal task forces or contracted for consultants to supply needed knowledge.

Professional business literature now discusses how these teams took resources from short term requirements.[5]

Downsizing an organization fits into a short term strategy to achieve efficiency and effectiveness through information systems. Without their former size, companies began employing more outside resources for short term projects. This "outsourcing" became accepted as a cost saver, returning apparent profitability. Some specialized companies tried to pull their subcontractors into a semi-permanent, sole supplier-client relationship. This generated the term, "virtual corporation," applied from a computer system's virtual memory; outside contractors who work as needed, free from the relationship until the next job.[6]

The U.S. Army has undergone a corporate downsizing, parallel to the one civilian corporations underwent in the early 1990s. Information technology has become more common in the military and many functions are becoming automated. This adoption of technology became overlaid on the established hierarchical structure. As the Army adds high technology systems, much of this established structure remains in place, though with fewer personnel and units.

The resulting smaller force may lack a robust ability to maintain itself in combat or when deployed to distant overseas locations. A potential result of a smaller

resource base is that a corps may fight without some vital resources. Possible candidates for the conversion of some functions to virtual organizations for a commander come from his staff sections.

Research Question

In the last few years of this century and well into the next, the political and technological nature of the world is changing. Business is reflecting political and technological change within society. The military will follow these societal changes, but must look at many other methods to adapt successfully. "Commercial enterprises, after a century of following the hierarchical military models for organization, are now diverging toward much more distributed, specialized, and flexible structures. Future battlefields may reflect many of the structural changes that are now becoming evident in the information-dominated commercial markets."[7] As the Army fights with a smaller force and fewer supporting resources, efficiency and effectiveness become more critical. This leads to the research question for this monograph: Can the functions of a Corps or Joint Task Force staff be accomplished by virtual organizations for the commander?

Methodology

First, this monograph explains the primary staff functions in a corps headquarters. Along with this explanation, the U.S. Air Force and Navy elements required to form a Joint Task Force (JTF) are discussed. Next, the theoretical basis of virtual organizations are investigated in recent business literature. Several alternate organizational structures show the benefits and costs of each. Criteria for advocating the adoption of virtuality come from the literature. Last, some proposed criteria show a way to measure corps/JTF staff operations for adaptability to virtualness. This will allow recommendation of staff positions or functions to become virtual modules.

Conclusion

Civilian businesses have begun adapting hierarchical organizational structures to new forms. This transition results from changes between Industrial Age production of goods to Information Age services. The Army has the potential to adapt traditional staff functions or structure in a similar fashion to businesses. Business and the Army must consider how much trust to put in the information carried through technological means. Trust between separate elements of an organization becomes a critical factor without traditional personal relationships.[8]

CHAPTER TWO

CANDIDATES FOR VIRTUALITY: THE STAFF

> "An unspeakable horror seized me. There was a darkness; then a dizzy, sickening sensation of sight that was not like seeing; I saw a Line that was no Line; Space that was not Space: I was myself, and not myself. When I could find my voice, I shrieked aloud in agony, "Either this is madness or it is Hell." "It is neither," calmly replied the voice of the Sphere, "it is Knowledge; it is Three Dimensions: open your eye once again and try to look steadily.""[9]

Introduction

> "The current staff organization was adopted after World War I and is based on the staff model the French Army used. It is a logical breakout of the various staff functions needed to provide processed information to, and aid the planning of, the commander. A flaw in the system is that, as you go to higher headquarters, the amount of data to be handled increases geometrically and so does the size of the staff even though tactical planning becomes more macro and allocation of unit, personnel and material resources becomes a major factor in operations."[10]

The most basic functions of a commander's staff do not change at different levels of command.[11] A staff gives the commander the ability to multiply the brain power directed at a problem or task. Sheer numbers of supported units and personnel require broader interest and responsibility at higher echelons. At these higher levels, such as the corps, the staff helps control two to five divisions with four or more supporting brigades, with a personnel total of around 60,000 or more. Coupled with these larger units are requirements for more knowledge about them by a commander,

requiring more staff to process this mass of data into useful information.[12] At lower than corps level, units have a direct focus on their specific task to move logistics or engage the enemy. Under special circumstances, these units can find themselves drawn into the operational realm. Without augmentation, they become swamped with reporting and coordination requirements beyond their normal capacity.

A corps already functions at the operational level of war. Army corps maintain a robust means to control subunits, communicate and coordinate with strategic level commanders over intercontinental distances. If required, staff augmentation to the corps comes from the specific mission given to it. The necessity to form joint task forces has become more common for both combat and non-combat missions. For joint task force missions, the most likely augmentation comes from the other military services as sub-headquarters, instead of liaison teams.

In the future, both near and long term, the ability of the corps headquarters to make a strategic movement to a theater and operate will likely come from an integrated, mobile staff. In either war or operations short of war, modern detection systems have made large stationary headquarters easily identifiable targets. Dispersion and passive defense will come through information systems that

give a common and accurate real-time perception of the battlefield to the headquarters.[13]

The Types of Staffs

A corps commander has three types of staffs working for him: personal, special and coordinating. The personal staff consists of persons with specific function or those with certain expertise who advise the commander. A command group has the commander, deputy commanders and a chief of staff or executive officer. "The purpose of the command group is to make and communicate decisions and to provide leadership, direction, guidance and supervision."[14] Since the commander requires their presence as part of his ability to direct his subordinate units, they must remain close in personal communications terms. Examples of other personal staff members are the unit chaplain, inspector general, staff judge advocate, public affairs officer and aides.[15]

The special staff often functions with members that occupy dual roles. Their primary role is to lead a special unit subordinate to the corps. Most often these are the commanders of air defense, engineer, military police or other units of a brigade, regiment or group size. Other members of the special staff occupy a single role, but are present for a special single purpose, or as liaison from other organizations. "Joint operations are composed of

elements of two or more U.S. military forces (Army, Air Force, Navy, Marines) and are inherent to Army operations doctrine."[16] Air Force and Navy/Marine (maritime) component staff additions to the regular corps staff cause a joint task force staff to form.

The Coordinating Staff

The corps G-1 (Personnel) section has the primary responsibility for all administrative and personnel matters. It does all required administrative personnel record keeping, financial and disciplinary functions. Within the personnel function, separate offices are responsible for: unit strength maintenance, personnel service support, law and order, administrative support of other personnel, and headquarters management. Many of these relate directly to civilian personnel functions. Administrative processing of promotions, awards and financial documents go through these offices to support the entire force. Unlike a civilian corporation, the military headquarters must also run a complete judicial system for violations of local civilian and military laws.[17]

A corps G-2 (Intelligence) section contains the necessary people and equipment for analyzing the operational reports from superior and subordinate units about enemy activity. Most of the effort for the staff section itself

centers on the analysis of the collected intelligence. A rough civilian equivalent, in function, would scrutinize competitors for advantages by reading business publications, interviews and direct observation of the production process.

A prediction of the next enemy action comes from several factors including past actions, enemy doctrine and political statements. This prediction feeds the organization's plan of action for the future. As a counterpoint, the intelligence section also seeks to block enemy collection of information about the organization. This counterintelligence effort must complement the organization's own collection effort and scheme of operations. The final component of the intelligence section's responsibilities is the direction of training for all subunits in the acquisition, processing, distribution and protection of information.[18] As a practical matter, the intelligence and operations sections work together during both planning and actual operations for the organization.

A corps G-3 Operations section is primarily responsible for planning, coordinating and supervising the execution of operations. It also has responsibility for overall safety and accident prevention, organizational structuring of subunits that includes workloading at appropriate levels and training of subunits. A civilian counterpart would provide strategic and operational business plans, research and

development, some marketing functions, plant operations, safety and some new employee training functions.

Just as for the civilian counterpart, the operations section requires detailed coordination with the other staff sections. The operations section always works closely with the intelligence section, normally co-located with them. The operations section maintains close communications with the personnel and logistics sections. If formed as part of a joint mission, the operations section works closely with the joint plans office (J5), the command, control, communications and computers office (J6) and the force structure and resource assessment office (J8).[19]

An operations section serves as the knowledge focal point for commanders to have continuous knowledge about their units. As subunits of the corps or JTF do their tasks, the operations section collates reports and depicts the status of the unit for the commander. This information contrasts the success or failure of the unit with the enemy actions, drawn from the intelligence section. The operations section has an office doing near term planning for the section and translating long term goals, objectives and the current situation into short term tasks.

As the corps operates, particularly when it must form the basis for a JTF headquarters, several other functions may become necessary.[20] The exact number and function of

these additional staff elements depend on the mission, but some typical elements are the fire support coordinator (FSCOORD), an air liaison officer (ALO) from the U.S. Air Force, a naval gunfire liaison officer (NGLO) from the U.S. Navy, a special operations coordinator (SOCOORD) from the U.S. Special Operations Command, a psychological warfare coordinator (PSYOP), a staff weather officer (SWO), and other liaison officers from assigned or attached units. If working with other nations, there will also normally be a liaison section from that nation.[21]

A corps G-4 section does the necessary logistics functions for the unit. This primarily includes all types of supplies, maintenance of all types of equipment, transportation within the unit's assigned area and other types of required services. Civilian counterparts in a business perform some of these functions, but not on as large a scale as the corps G-4. This section plans and supervises food, clothing, fuel, housing, sewage, repair parts and other military unique supplies for a city of fifty thousand or more people. Maintenance includes the repair and servicing of all the assigned vehicles and aircraft, normally numbering several thousands of all types. Transportation offices run the equivalent of several national and local trucking companies or small airlines to move personnel, equipment and supplies over an area of two

thousand square kilometers or more. Services work covers some parts of the previous logistic functions, but includes the necessary logistic planning, personal services, contracting with local civilian companies, logistics training and mortuary affairs.[22]

There are other elements necessary to form a joint staff. Air Force and/or Navy elements must be added to make a force joint. The force itself is to perform a specific limited objective, without centralized control of logistics.[23]

> "The joint force air components commander's responsibilities will be assigned by the joint force commander (normally these would include, but not be limited to, planning, coordination, allocation, and tasking based on the joint force commander's apportionment decision)."[24]

A Joint Force Air Component Commander (JFACC) and his staff functions as the planning, operations and control staff section for air operations. In this respect, it operates like the ground commander's G-3 operations section. During the Gulf War, the JFACC Director of Combat Plans received support from two groups, one in theater and one in Washington, D.C.[25] This headquarters became responsible for all control and direction of air operations in the theater. The split locations of the planning cells did not influence the air campaign operations as they could talk regularly to pass information.

Much like the JFACC, the Joint Force Maritime Component Commander (JFMCC), also has the duties of a functional component commander. The JFMCC centrally controls functions or types of operations, particularly if two or more forces operate in the same medium or area.[26] In an undeveloped theater, the JFMCC may provide facilities for the joint force headquarters or function as the JFACC while the operation is mainly maritime based. The JFMCC and his staff function as a planning, operations and control staff for maritime operations. These operations normally divide in two areas, first, from the open ocean to the shore. This orientation gives the JFMCC responsibility to conduct the naval campaign against an enemy fleet. Second, the JFMCC can fight from the shore to the limits of the landward area supportable and defendable directly from the sea.[27]

Conclusion

With the most basic staff operations in a corps and JTF defined, the functional areas become clearer. Some portions overlap or require intense coordination. The corps' coordinating staff provides a significant amount of internal and external coordination for the commander. A corps staff has the robustness necessary to absorb additional elements, including the planning, controlling, communicating and reporting requirements for diverse types of forces. Modern

means of communications interconnectivity allows distributed, open organizations for information exchange.[28] Civilian business has begun a revolution from hierarchical organizational structures to open, distributed forms. With the introduction of new operational ideas, the time may also be right to introduce new organizational concepts.[29]

CHAPTER THREE

FINDING VIRTUALITY

> "The minutes of the previous meetings were now read by one whom I at once recognized as my brother, a perfectly Symmetrical Square, and the Chief Clerk of the High Council. It was found recorded on each occasion that: 'Whereas the States had been troubled by divers ill-intentioned persons pretending to have received revelations from another World, and professing to produce demonstrations whereby they had instigated to frenzy both themselves and others, it had been for this cause unanimously resolved by the Grand Council that on the first day of each millenary, special injunctions be sent to the Prefects in the several districts of Flatland, to make strict search for such misguided persons, and without formality of mathematical examination, to destroy all such as were Isosceles of any degree, to scourge and imprison any regular Triangle, to cause any Square or Pentagon to be sent to the district Asylum, and to arrest any one of higher rank, sending him straightway to the Capital to be examined and judged by the Council.'"[30]

Introduction

Because of industrialization, businesses sought an efficient structure to control the manufacture of goods. The military hierarchy provides a good model for the control of workers who were undifferentiated in the production process. Since mass production of few items was the goal, the requirement for a manager centered on the control of the process. The need for efficiency in production overrode most other considerations for effectiveness in the organization. While business remained tied to the manipulation of physical resources into products, a hierarchical control system worked well. This type of

system also worked well for the military to control warfare during the Industrial Age. With the beginning of the Information Age, the military needs to examine civilian institutions for useful organizational concepts.[31]

With the arrival of information technology to quickly distribute large amounts of data, individuals or small task organized teams of workers can make decisions on a broader range of problems. This ability to move information to a decision maker has weakened the need for traditional bureaucratic offices of the past. The ability to work with diverse subunits, within a framework toward a common goal, making decisions much faster than the competition or an enemy, remains critical to the military and to businesses. Survival for the organization requires the best detailed work available and that may not be in a single traditional organization. As the information age begins to take hold, military and business leaders must find a way to take advantage of technology while maintaining a competitive edge over any rivals.[32] "Incremental change is what we're used to . . . now we must not only manage change, we must create change -- big change -- and fast."[33]

Common Types of Organizational Structures

With the continuing need to change and adapt to the current situation in business or the military, non-

traditional forms of organizing may hold the key to success. This has been done at the Army's tactical level by task organizing different units to meet a specific anticipated threat. This task grouping fights for a time and then reorganizes as the threat changes around it. Civilian organizations have also begun to adapt this type of thinking to meet their competition. In both cases, the goal is to gain flexibility, provide a rapid response to opportunity and meet short term needs for profitability.[34]

The most familiar type of organizational structure is the hierarchy (shown in Appendix A, Diagram 1). This "scientific management" gained prominence by Frederick W. Taylor in his book Principles of Scientific Management, published in 1911. Most often in business, this structure can apply to single item manufacturers in stable markets, or smaller retailing businesses. For the U.S. Army, this structure looks like nearly any unit or organizational diagram. Sub-divisions in the structure are done along geographic, functional, processing or market lines. Vertical integration of internal business processes is excellent in this organization. Horizontal organization, communication between the various departments, tends to be limited and occur only at the upper levels. A hierarchy allows the upper management to set priorities with a main effort for the entire company. It also allows employees to

see and understand the chain of command, the company develops a broad base of experience within the specializations it needs. Some disadvantages also come with this structure; there is no single individual with full responsibility for actions, several layers of management separate worker and decision makers, and the production process, rather than the customer is the focus of the company operation.[35]

At the opposite end of the spectrum from the hierarchy is the pure project organizational structure (shown in Appendix A, Diagram 2). Each project is a self-contained unit with independent operation. For business, this could resemble a holding company with diverse sub-companies or a single company with different, likely related, product lines. Within the U.S. Army, this structure resembles a corps with assigned divisions, each project element nearly the same, with slightly different total capabilities. The top level of management may exercise tight or loose control over the projects and their work. With the title of project manager come full authority and responsibility for the work and product of the team. Other advantages are a group identity, a stake in the outcome of the project and a flatter organizational structure that translates to faster decision making. There are few levels of management between the worker and the decision maker to work ideas through.

With the independent nature of the project teams comes some duplication of effort, an obvious disadvantage when resources have limits. Other human factors can build a destructive We-They attitude within the team or even cause excess stockpiling of equipment or personnel to react to unforeseen contingencies.[36]

A third type of structure sits between the listed extremes. The matrix organizational structure seeks the middle ground between the hierarchy and pure project types (shown in Appendix A, Diagram 3). Functional ownership of the components in the business appears the same as for the hierarchical structure. These owners must allocate personnel, time and resources to support projects ranked by the top management level. Within the business, functional managers can then fully employ their experts by timesharing among multiple projects. Applying this to the U.S. Army, this type of structure resembles the supporting units of a corps that provide single, special functions on the battlefield. This approach allows the project manager to retain full responsibility for the product. Simultaneously, the company balances the resources and effort available, providing a holistic, systems approach to the business. Extensive coordination becomes necessary to attain the best system performance, a potential disadvantage. If the project manager does not get full authority for the project,

delays or failure may result. Workers also can become confused about priorities, their chain of command and the organization unless they have clear guidance.[37]

A mixed organizational structure also comes between the extremes of hierarchy and pure project types (shown in Appendix A, Diagram 4). Mixed structures leave the hierarchy intact while gaining some flexibility in actual operations. At the conclusion of a successful venture, the project staff and manager can be spun off from the parent organization and form a new division of the company. There is no direct, obvious parallel for the mainstream U.S. Army organizations with the mixed structure. There is some resemblance to staff projects that use portions of other groups to complete work and have the potential to become permanent features to a commander's staff. Advantages of this form include the same type of holistic system approach to the operation as the matrix organization and little duplication of effort found in the pure project type. Disadvantages remain similar to the matrix organization with resource allocations and coordination among functions contentious issues.[38]

Another type of organization is the shamrock organization (shown in Appendix A, Diagram 5). It builds on three separate and identifiable types of employees. There is a professional core who remains permanently with the

company. This remains a small, dedicated group, able to share in the corporate culture and vision. A second group comprises the contractors and suppliers who maintain separate, though long term, relationships with the core company. Contingency workers form the final group. Part-time, temporary or subcontracted personnel join the core group on a task basis. More workers are added when the work volume is high, fewer or none when the workload is light.[39]

From within these basic organizational types, the U.S. Army leaders make decisions to tailor or adapt units to operate successfully in combat and short of combat. Mainly, these have been adaptations to specific situations and a return to previous structures after the war. The supporting staff, aiding the commander in gathering information, decision making and distribution of those decisions, has remained a stable and fixed constant. Civilian business has continued to grow away from the fixed hierarchy to gain advantages over competitors in a limited resource environment. The U.S. Army now faces a situation with variable missions, environments and enemies with highly different levels of lethality and technology. It is entirely possible that a new organizational structure is required for successful mission accomplishment.

The Virtual Corporation

> "The most obvious difference between the virtual corporation and its predecessors is that the former will be much 'flatter,' with the many layers of traditional middle management replaced by enormous, technology-aided spans of control by top management."[40]

From the outside, the virtual corporation appears small, little more than a small office. In terms of results, the company can produce a result normally expected of larger traditional companies. A virtual corporation extends from the core controlling company up through the supplier and down through the distribution-sales system chain. All segments of supply, production and retail sales remain closely linked for survival and success in a market.

The supplier must meet the regular needs of the producer. This is a minimum standard, rather than the traditional view of meeting goals as a maximum. For the virtual corporation to survive, the supplier must anticipate market fluctuations and enable manufacturers to take advantage of high demand. For this very responsive supplier to work, the supplier needs and the manufacturer must allow a high degree of access to plans, sales strategies and financial plans. Most leaders, military or civilian, would be reluctant to allow this sort of access by outsiders.[41]

Similarly, the distributors and sales system must respond with detailed information about their plans to

handle the product. This includes gathering market information that influences the product line and may even narrow it. The virtual corporation needs this information to quickly serve a demanding, volatile customer base. Sheer volume of required market information represents an investment by itself. A virtual company must recognize an opportunity, form itself and respond to a market need. The company will then disband or continue changing to meet demand, possibly not realizing a profit for several product generations. Customers then become part of the chain, not as an end state, but as a feedback mechanism that tunes the entire chain of production.[42]

Inside the virtual organization, traditional organizational structures no longer fit. Suppliers and customers penetrate much further into the producer as they feed required information into plans, organizations and decision making. The virtual company may retain some hierarchical structuring or titles, but appears much flatter than other companies. This comes from removing previous layers of bureaucracy and replacing them with an advanced information sharing system. As an aid to managers, this technology seeks to increase their span of control over workers. A required by-product for leaders and workers comes from shortening decision making and distribution times in the organization. For a virtual corporation this may be

the single biggest advantage when competing with traditionally organized companies.[43]

To take the plunge and become virtual, there are risks. "People want to buy information-based services and products from visible companies that operate as partners. They do not want commodity products from black boxes."[44] People also want to deal directly with the members of their team, work group or for the manager and leader, their staff. Eliminating a large portion of middle management can create its own problem. Senior leaders must stay current with what the company does and how it does it. Their technical skills can no longer decay as they rise in the organization, traditionally requiring more personnel skills. An additional contradiction to current practices will be a need to have less direct control of the individual activities of subordinate organizations. For many senior leaders, particularly in the military culture, this can represent a loss of power and status.[45]

Changing to a virtual structure also represents changes to the workers. Continuous training becomes necessary as personnel rotate in and out of the organization, whether as permanent or subcontracted members. Just as senior leaders will perceive a loss of power, subordinates will perceive a gain in the ability to make decisions.[46]

"The mass-production mentality of the '50s and '60s has evolved into a surge toward mass customization."[47] This civilian business trend accurately reflects the downsizing of the U.S. Army since the end of the Cold War. With more limited resources and an expansion of missions, organizational structuring must shift to meet the task at hand. Task organizing has long been an ability for fighting units within the Army. Ideally, this confronts an enemy force with a devastating combination of complimentary weapons. In business, mass customization reflects flexibility and responsiveness from the company and temporarily grouped resources to overwhelm a competitor. The Gulf War in 1991 provides the first examples of information warfare and some first conscious use of virtual organizations by the military.

Two Examples

Virtual organizations are already in use in both business and the military. These examples illustrate the basic principles of virtuality for organizations. The first is a civilian business example, followed by a military example from Operation Desert Storm in 1991.

Rickard Associates, an editorial production company in Hopewell, New Jersey, has only three employees at its headquarters. The owner, Wendy Rickard, her assistant and a

part-time employee. This virtual company produces magazines and marketing materials, with editors in four geographically distant locations in the U.S. The art director lives and works in Arizona. Rickard makes extensive use of freelance contractors all over the country to produce materials for her clients.

The company is almost completely dependent on computers and connections through the Internet. With the ability to network the computers together, the distant employees remain in contact with each other. They work together through the exchange of information and electronic documents as if colocated. As Rickard, her editors and art director work on a magazine called *Educom Review*, they exchange articles, pictures and layout designs through electronic mail and file transfers between their computers.

Rickard originally got a job with Educom, a company located in New Jersey. In 1987, the company moved to Washington, D.C. and Rickard stayed behind. She managed to keep the job through electronic mail over the Internet. Rickard does not style herself as a computer technician, simply a user with some limited technical knowledge. The six years of work on the first magazine has now offered more opportunities to expand.[48]

This virtual company has a small core staff that coordinates the movement of information, makes decisions and gives directions to the virtual components. Freelance workers are added to the company for short term projects and leave the company when their work is done. Most companies have found it useful to maintain a regular relationship with these workers, but without the overhead required for more traditional employees. The actual production of the paper magazine or other materials can contract out to a printing company, a delivery company for pickup and then delivery to the customer. Rickard Associates enjoys the advantages of a larger traditional company without the requirement to make heavy investments in facilities, equipment and raw material stocks.

A military example of a virtual organization can be found in the Gulf War. The Central Command (CENTCOM) headquarters, General Schwarzkopf's command, is based in Florida. During peacetime, it has a small staff and works on contingency plans for the Middle Eastern theater of operations. When President Bush announced the movement of U.S. forces to defend Saudi Arabia, CENTCOM packed and moved to the country.

CENTCOM immediately began to receive plug-in modules of additional staff for the mission. U.S. Air Force planners in the Pentagon received a task to help in preparing a plan

for defending against, and later attacking, the Iraqi forces. Large geographic weather forecasting information came from the U.S. to help CENTCOM meteorologists. Repair parts for Air Force aircraft in Saudi Arabia and supporting countries became centrally managed for CENTCOM at Langley Air Force Base in Virginia. U.S. Space Command, located in Colorado Springs, Colorado, provided photo imagery and SCUD missile attack warnings from earth orbiting satellites moved and focused on the Middle East.

These diverse organizations also retained other supporting responsibilities elsewhere in the world while setting priorities for their efforts to CENTCOM. At the end of the Gulf War, the virtual organization dissolved. CENTCOM returned to Florida and again became relatively small.[49]

Judging Virtuality

With any organization, the internal structure requires deliberate design to fit the needs of production, whether the company produces a good or a service. As one man entrepreneurship develops into small companies or even large companies, structural design often evolves instead of growing by a plan. Virtual organizations represent a return to small company characteristics for each component, while still welding the power and abilities of large companies.

Internally, the subunits of a virtual corporation could resemble any of the previously discussed organizational forms.

By using subcontracting to rid itself of many full time employees or by simply downsizing, a company can begin to look virtual. There is more to virtuality than small size and dispersal of production. "But here's the rub: it takes a virtual company to create a virtual product."[50] Companies, their suppliers, markets and their products share some common characteristics. Malone and Davidow developed a checklist to examine virtuality in a company.

> Product Development: Use of computers, simulations with customer, producer and suppliers working together.
> Product Manufacturing: Work teams that control a project with flexibility to take advantage of business conditions.
> Virtual Products: Mainly information collection, interpretation and distribution. Links between supplier, producer and customer are close.
> Channel Relationships: Shared destiny for the participants, based on the actions of each. Electronic systems used to exchange information quickly.
> Management: Fewer middle level managers, broader spans of control through information systems, delegation of authority and responsibility to workers. Senior leaders become more visionary.
> Employees: Education and training of employees become an ongoing program.
> Organizations: Fewer traditional hierarchical structures, more organizing to fit the current task or job. Liaison teams from outside the organization to smooth transactions. Management centralization with combined staff positions.[51]

This list may work well for civilian companies. Military organizations have many of the same characteristics of their

civilian counterparts during peacetime. Additional authority and responsibility accrue during war time, as military units must fight, replace casualties, sustain the deployed force and remain a viable force. Though this looks like civilian company's production, personnel, logistics and corporate survival, the ultimate consequences are more serious for the individuals. Malone and Davidow's checklist requires adapting to fit the military.

Conclusion

The Army and business have a shared relationship in developing and using management and organizational practices. This exchange can allow each side to adapt and develop the best characteristics for their own use. With the current emphasis on information technology in the Army, two ideas, among several have come forward that translate some virtual organization ideas into Army terms.

The first idea is the network army. "Network Army -- the idea that the Army may not need to physically move many of its resources in order to bring them to bear on the battlefield."[52] This idea relates to developing a matrix organizational structure for supporting tactical units on a battlefield. At the operational level, the corps structure may more closely resemble the shamrock organization.

The second idea is the army of armies. "An Army of Armies -- the idea that the changing tasks of the Army may call for differently organized, trained, and equipped units rather than 'one soldier fits all' tasking."[53] Within this idea is the concept of developing specialized, single purpose units. While this would simplify the selection of a unit for a particular mission, it limits the designation and focus of a main effort for the larger organization. In some ways this maintains a hierarchical structure along functional lines at the tactical level. At the operational level, some characteristics of the shamrock organization could take over in supporting functions. The mixed or matrix organizational structures could also help in allocating some limited resources to support deployed units.

These ideas are all limited for the Army by their failure to apply modern information systems to new structuring. None of them consider how information technology on the battlefield changes the span of control or merges traditional staff functions. Additionally, there will no longer be robust supply of units, manpower and time to fight a major conventional war like World War II. The smaller, force projection Army looks for massed effects of its physical parts, rather than physically massive parts.[54]

CHAPTER FOUR

THE VIRTUAL STAFF

> *I.* "O, my Lord, my Lord, behold, I cast myself in faith upon conjecture, not knowing the facts; and I appeal to your Lordship to confirm or deny my logical anticipations. If I am wrong, I yield, and will no longer demand a Fourth Dimension; but, if I am right, my Lord will listen to reason.
>
> I ask therefore, is it, or is it not, the fact, that ere now your countrymen also have witnessed the descent of Beings of a higher order than their own, entering closed rooms, even as your Lordship entered mine, without the opening of doors or windows, and appearing and vanishing at will? On the reply to this question I am ready to stake everything. Deny it, and I am henceforth silent. Only vouchsafe an answer.
>
> *Sphere (after a pause).* It is reported so. But men are divided in opinion as to the facts. And even granting the facts, they explain them in different ways. . . ."[55]

Introduction

The civilian development of virtuality, offers the U.S. Army in the 21st century a new concept to stabilize the organizational culture. Affecting the selection of an organizational structure are: socialization, economics, technology, life cycle, resources, information flow and company orientation.[56] These require incorporation in a Malone and Davidow style virtuality criteria for the corps or JTF staff sections. Unintended outcomes will influence acceptance and work production from a virtual organization. The commander and his staff may adapt to a new form of working together while redefining the traditional roles that each possesses.

Adapting the Virtual Checklist to the Army

Although not a social organization, the army social culture influences every interaction. Based on a functional hierarchy, social status comes from rank, expertise and experience. Leaders undergo institutional education during a career, but receive their upbringing through informal coaching by superiors.[57] Valuable lessons are taught to juniors on how to work in the organization and become successful. If junior leaders learn to keep everyone on a staff centrally located, then they will mimic the behavior later. Imitative behavior later in a career can easily become an avoidance of risk and thus new ideas. This affects middle managers in the military and civilian sides equally and nips innovative thought in problem solving.[58]

Leaders are learning to look for advantages through technology and creative ideas. This has led to a focus on the technology side of economics. It is easy to quantify and justify the purchase of an item with charts of numbers to show how it does more than the current version. Adoption of a creative idea is much harder to quantify. The downsizing periods of "do more with less" fail to realize a

base level of support. Without excess money available to buy technology, creativity can provide solutions to problems.

Communications, computers and simulations all address the technology portion of the organizational structure. As companies and the Army have downsized in the last few years, all these systems have replaced and augmented people. Technology and the flow of information have become closely tied together.[59] Unintentionally for most organizations, they encourage information exchange among lower level workers. New freedom in information flow, up, down and laterally aids the staff in giving a leader the best situation picture possible. The machines also speed up the work processes and can aid in decision making.[60]

These factors in organizational structuring apply equally to the corps staff sections. Corps operations can be short or long term. The mission and expected life cycle of the mission influence structuring of the staff. A corps staff operating in a short term, unstable environment during combat argues for immediate decision making through small staffs. Technology could aid this with support from outside agencies or other decision aids not in the immediate chaos of the battle. This type of life cycle and organizing for work is a characteristic of virtual organizations.[61]

Resourcing from available stocks, either large or small, leads the staff in the planning - development -

production cycle. If limited economics force an operator to accept just-in-time delivery, production is limited to that flow. By extending the planning and development portions of resourcing backward toward the supplier, delivery is much more likely to occur as required by production speed. For the corps, logistics and operational planners must work more closely together than previously to support a deployed corps.

Finally, the leader influences staff structuring through personality, goals and objectives. Often the leader exhibits this by choice of task, customer or product and the work flow between them. Within the corps, as within a business, the orientation may shift with the situation or the particular point in producing a result. Senior leaders must make their intent known to subordinates and keep their approach consistent.[62]

When given the mission to form a joint task force, the leader adapts staffing from existing structures. Naturally, the leaders rely on their experience and transplant most or all of the staff functions they are familiar with. Often the same staff officers are moved for their familiarity to the task force leader. Senior leaders exert influence in subsequent assignment of known officers to their new organizations. There are many cases of officers following former bosses to new organizations.[63] If the old

organization could split off the leaders and a smaller staff, or hire outside specialists for the mission length a more economic solution might come about.[64]

Wrapped within the commander to staff relationship is the issue of trust between members of the organization. Familiarity allows a commander the comfort of knowing his primary concerns are in the care of his closest associates. He does not have to constantly reiterate major concerns. For civilian business, the replacement of trust between individual businessmen became contract laws. Recently the Army has begun emphasizing standing operating procedures and "contracts" between levels of command to accomplish missions. For the virtual organization, trust will be a major factor for commanders to consider in accepting analysis from organizations they may not know or control.[65]

A Proposed Virtual Checklist for the Corps

With a unique corporate culture and fighting wars as a product, the U.S. Army does not fit neatly into Malone and Davidow's virtual checklist. The corps headquarters will tend to concentrate in one location, focusing on the core functions of planning and directing operations. Other elements of the corps can be geographically dispersed, but still require task, purpose and an achievable end state to focus their efforts. A proposed checklist should give the

leadership guidance on whether the staff could be reduced at the deployed headquarters. Outcomes from this decision may actually provide increased protection and effectiveness of the staff for the commander.

Product Development: For a staff, the product becomes the plan and supervision of execution as an extension of the commander's abilities. Currently, the U.S. Army is adding computing power to aiding decision making in the planning process. Computer simulations are primarily training tools, but could easily adapt into real world modeling of contingency operations.[66] Higher and lower staffs attempt to link with each other and conduct concurrent and parallel planning, particularly when time is short. This links the design teams together for both operations planning, support and gives a critical link between a provider (supplier) and an executer (customer).[67] The staff can fulfill this checklist item as currently configured. Actual operation requires attention to integrate the various parts of the staff to units systems for lead time in execution and anticipation.

Product Manufacturing: Work teams are often formed within the staff, particularly in the planning staff and the operation monitoring within a headquarters. For planning, members of each staff section and special or personal staff representatives are brought together as needed. During the

execution of a plan, the headquarters contains members or liaisons from the staff and subordinate units. On the battlefield, enemy targets of opportunity need quick attack when weapon systems are within range. Geographic maneuver to a position of advantage may be necessary to attack a target in either time or space. The evaluation of how, when and where to attack an enemy must be balanced against the effect desired within the overall plan of operation. Currently the staff does this task with most of the workers colocated, or separated into up to three locations.[68] This method requires staffs to increase their size to be prepared for many possible tasks. The staff then also becomes a logistical burden equal to a deployed unit that fights or provides combat support. Facilities and access to information can become limited for this large staff based on communications support.

Virtual Products: Most staff actions involve moving information from one location to another. Every section has a requirement to process raw data into information and tries to form a coherent picture of the chaos on a battlefield. This picture must adapt constantly to the situation and the needs of the supported and subordinate commanders. In terms of number of personnel, this planning, tracking and moving information about events are a small number of people. Additional technology integration into the entire staff

could allow a small staff forward to devise and distribute plans, monitor operations and help the commander. This forward headquarters would draw on a larger staff geographically distant to provide detailed, processed information and other types of execution support.

Channel Relationships: An army corps that is deployed shares a co-destiny with supporting elements, subordinate units and other services. This relationship becomes very intimate when the corps forms the basis for a joint task force. Normally proprietary data of each service is pooled and tasks assigned based on who has the best ability to accomplish it. Electronic data interchange has become a goal, but is not presently completely possible.[69] Cross-training and education in the needs, methods and peculiarities of each service and specialization within a service has become a continuous process. By openly sharing information between members of a staff and between services, trust is promoted and the relationship improved. This does require honesty in the dealings to maintain high levels of understanding and quality within a staff.

Management: Military leaders tend to add people, thus capability, to a staff. While not a unique cultural phenomenon, this is the product of experience. When tasks become more complex, this adds to middle management, narrows the member span of control and does not make use of

management information systems. There is a great deal of decision making by subordinate commanders, but staff decision making is contingent on the commander and his personality. Management styles still derive from authoritarian models and most likely must continue this way due to the nature of conducting war. Extending the span of control and reducing middle management is not simply a matter of eliminating some subordinate headquarters or cutting staff sizes. Span of control can increase with the use of automated systems to gather and process routine reports, looking for specified indicators of trouble.[70]

Employees: Team building is often a focal point of integrating new members to an existing organization. This holds equally true for new staffs formed from several organizations, like the JTF staff formed from Army, Navy and Air Force units to do a specified mission. Job security and performance rewards come from successful completion of the work, professional acclaim, medals, promotions in rank and follow-on jobs. Increased decision making powers for the staff officer come with the personal and professional confidence the commander has in that person. It does not relieve any responsibility in reporting on any decisions made, but allows freedom for the subordinate to act. This area is highly dependent on the commander for authority delegation to the staff members. With a smaller staff and

large responsibilities, authority is much more likely delegated. Team building skills become more important since there may be little skill transferability among the few experts present in the core organization.

Organizations: Liaison teams of two or three individuals have become common between headquarters, both higher, lower, adjacent and supporting. This represents on-site employees from suppliers and customers. A smaller staff allows a commander to centralize activity management. This can become a dual edged sword for the leader. The leader must remain oriented on the larger picture and macro-decision making. Simultaneously, a smaller staff, backed by extensive off-site resources, must anticipate and translate the leader's desires as focused tasks and jobs. A corps staff, with or without other service components to make a joint staff, draws on outside sources for information as presently configured. It does retain definite edges to the organization and a defined hierarchical structure, characteristic of the military.

Staff Sections and/or Functions that fit into Virtuality

Applying the proposed virtual checklist to the corps staff sections gives an idea of which could adapt and which could not. Even if a section could function as a virtual module for a deployed corps, there may be institutional or

cultural reasons preventing the conversion. Commanders would retain the decision making ability to employ virtual staff functions or require their full deployment to a theater of war.

The G-1 section functions with supporting units to process administrative actions. Their products are directed to moving personnel forward and maintaining appropriate strength. On-site personnel are required only for direct processing of documents. Planning, reporting, law and order, and headquarters management require personnel to directly support the commander.

Product manufacturing becomes distributed to many locations with the deployed staff feeding the non-deployed staff members who process work and return it. The loss of information during deployment or through combat is a reduced concern. G-1 products are mainly virtual products, the moving of personnel information from one location to another. Personnel replacement and movement also reduce with processing done outside the theater and point delivery to subordinate units. Established channel relationships would continue uninterrupted during the deployment. Deployed personnel staff would continue to talk with the same personnel they previously dealt with, changing methods to video conferences, electronic mail or telephone. Time zones would become less critical since the communications

architecture and staffs still man for continuous operations.[71]

Management of personnel assets would be visible at a higher level, increasing the span of control for the commander. Staff decision making ability would have to increase to support the commander's intentions. Reporting from subordinate units would necessarily become critical, requiring the data processing potential demonstrated in some battlefield computer systems. Employee motivation and training would not need significant alterations; they would need a different outlook on work performance through virtual organizations. Organizing with liaison teams would most likely be small for the personnel staff. Visits between units would occur, as they do now, but most functions would continue through data transmission, rather than direct contact.

The G-2 intelligence staff already draws a large portion of their data from outside the corps sources. By leaving personnel behind during a deployment and linking them to the forward elements electronically, the corps can use more sophisticated technical means to gather information. A deployed intelligence staff would then concentrate on information requests to support the commander's immediate concerns. Real time information could also link directly to the forward staff, if required.

Product manufacture depends on the intelligence and operations sections working very closely together. An ability to link processed information directly into the operational plan development would allow greater anticipation of the enemy actions. This would begin a faster capability for the corps or JTF to take advantage of any opportunity to destroy or disrupt an enemy plan. The intelligence section represents the ultimate virtual production system. It moves data about the enemy from a variety of sensors, satellites, electronic monitoring, human observation, collates it, interprets and distributes the information to units and the rest of the staff.

The staff located with the commander depends on other units, higher, lower and adjacent for a linked destiny of survival on the battlefield. Management of the intelligence assets represents an area of conflict for virtualness. Many systems would be shared, some might become unavailable due to the strategic context of a corps/JTF operation. The commander might be temporarily blind to a significant occurrence with units suffering defeats until another method replaces it with less capable systems.

The intelligence section members will still maintain their primary relationships with other units and staffs. A purpose of adding assets through a virtual organization for intelligence would be to double or triple the clarity and

ability to gather data and assemble it into a coherent picture. Virtuality would likely drive the intelligence and operations sections much closer than they are even now. Liaison would function mainly through the intelligence collection system itself for the corps. When operating as a JTF, each service would have to establish a continuous liaison element with the others. This liaison team would help with information exchange, requests for information and activity coordination.

The G-3 operations section has many functions that could be served by virtual organizations. For the corps, with the control of ground combat units and coordination of forces and attacks in both space and time, virtuality may not be practical. When operating as a JTF with Air Force and Navy or Marine components, virtual functions become much more practical. Commanders of other services could use virtual organizations to stay with their units to provide leadership and command. A vice-commander with the JTF headquarters provides a vital link between the two commanders, JTF and component service.

G-3 product development and manufacture are the plans for the unit and subsequent operating of that plan. Information feeding into the mission analysis and course of action development process can be done without direct contact in early stages. As planning and operating

continues within the staff, more direct contact becomes required to simplify the information exchange. Products themselves, written orders, graphic symbology and overlays for maps transmitted electronically. This capability is currently used within divisions and corps already.[72]

Most channel relationships will remain stable for the staff itself. They will remain in contact with the same people, either face-to-face or electronically, whether deployed or not. Change will take place as the task organization takes place with units not normally allocated to the corps. The headquarters staff and subordinate units in a corps already share a close co-destiny relationship. Management style and leadership from the commander and senior staff officers will remain perhaps the most significant factors. This human dynamic often transcends the capabilities of information systems to assist analysis of data. With automated systems, the human desire to lessen uncertainty becomes a quest for perfect knowledge. Often this results in lost opportunities while the staff waits and the enemy continues to freely act.[73]

In the logistics staff, the G-4 section can also gain knowledge by using virtual organization developments. Both product development and manufacture depend on information about where supplies are located, numbers, types and expected delivery dates. This information feeds from

subordinate organizations become linked to the G-3 plan; can units supply and have continuous support, allowing them to accomplish their mission? This gives the G-4 section a virtual product to deliver. Dispersed workers move supplies around with centralized direction from a relatively small staff.

The channel relationships remain relatively stable over the long term, since the supporting units often stay with a single corps. Extensive electronic data interchange reports current supply levels and helps maintain a co-destiny with the supported units. Management for the supply operations tends to have centralized planning to support the G-3 section's planning, but execution often remains decentralized with small units operating semi-independently to make actual deliveries.

Workers from several services work together in the actual delivery of supplies. Each service uses its unique capabilities to move equipment and material; the Air Force with airplanes, Navy with ships, the Army with trucks and helicopters. Direct delivery can become more prevalent when Just-In-Time methods are applied to the military during combat. The staff, in relation to the number of units and personnel controlled, already is small. Objectively, this staff should become even more edgeless to fully control logistics operations by using liaison teams.[74]

What the Staff Looks Like

The corps or JTF staff would be close to the same size before any deployment to a theater of operations. Some personnel savings could occur by employing available communications and centralizing functions to allow point deliveries. Deployment would radically change the look of a corps staff and the JTF when a corps formed the base headquarters.

Movement to a theater of operations and organizing assigned subordinate units for operations will remain time intensive.[75] If the functions requiring large supporting staffs, facilities or equipment are left at the home station then deployment requirements are much less. The number of communications systems, satellite or telephone systems, is much higher since functions cannot be simply deleted. A rotation of personnel at the home station must be dedicated to supporting the deployed element. This translates into the larger share of information processing, tracking and production done at the home station and shipped forward electronically.

The deployed headquarters elements contain only the personnel and supporting equipment necessary to connect to the home station and directly support the commander's immediate requirements. In relative terms, each staff

section will require representation, but becomes more interested in helping the commander in controlling the units. The exception would remain the G-2 and G-3 sections that carry a burden to operate and plan simultaneously while having an intimate knowledge of the commander's thoughts. They also serve as a distribution hub to the rest of the staff and units for information about current and future operations.

As the Army transitions to increased use of computers and electronic information exchange among units, the organizational structure of the staff can also adapt. The deployed elements of the corps would retain the command group. The special staff would remain available for the commander, but dual role members would remain in their primary location. Immediate availability to them would come through information systems for the commander. Though delayed, they could be brought together with the commander as required. Leaving special staff officers who are also commanders with their units give them more flexibility to control their own organizations and operate with their own staffs directly. By placing a deputy or vice commander with the corps or JTF commander, personal contact and relationships are still maintained.

Using knowledge based teams to support the commander provides an option worth investigation. These teams would

consist of permanent members from the traditional sections of the coordinating staff. Each team would have personnel, intelligence, operations and logistics experts to plan and execute missions. By using multiple teams mirroring this composition, the staff retains the ability to plan for the future and act in the present. These teams would become the future planners of operations, then transition to the executors as the heads of their specialties in the operations center. Intimate knowledge of what the commander wanted, what they planned and the current situation should smooth out transitions and changes in missions. The team typifies a virtual organization since it keeps a small group concentrated on core competencies and adds other staff members as required for a mission. These additional staff members, the FSCOORD, ALO, NGLO, SOCOORD, PSYOP, SWO and others would rotate among the knowledge teams as required for planning and execution.[76]

Conclusion

External factors that affect the investigation, adoption and use of new organizational ideas can become more important than gains made from the new structures. The proposed virtual checklist for converting army staffs only partially considers these factors. Individual commanders will tailor their staffs to fit their own personalities and

information support needs.[77] Changes to the staff from traditional forms may or may not be allowed by senior commanders.

By using the proposed virtual checklist, commanders could select functions to run from locations away from the main command post, even outside the theater. Reliance on national communications and reconnaissance systems for information is much higher in this case. The ability to form virtual staff elements gains significance when units are assigned into a theater and given missions based on political reckoning, rather than military advice.[78] Commanders in such a deployment could lower their staff overhead while maintaining all services, functions and capabilities currently available.

CHAPTER FIVE

CONCLUSIONS

> "At last, to complete a series of minor indiscretions, at a meeting of our Local Speculative Society held at the palace of the Prefect himself,--some extremely silly person having read an elaborate paper exhibiting the precise reasons why Providence has limited the number of Dimensions to Two, and why the attribute of omnividence is assigned to the Supreme alone -- I so far forgot myself as to give an exact account of the whole of my voyage with the Sphere into Space, and to the Assembly Hall in our Metropolis, and then to Space again, and of my return home, and of everything that I had seen and heard in fact or vision. . . .
>
> Need I say that I was at once arrested and taken before the Council?"[79]

Conclusion

Virtuality has become a lever for business to take advantage of modern communications and computing power. It allows companies to concentrate on their core skills, while taking advantage of external skills as needed. This allows companies to work on projects much larger than they might have undertaken in the past. Perhaps the most significant advantage of virtuality is that it reduces the facility and personnel overhead for a company to only the core group of employees.

Virtuality can give a downsizing company an economic boost by fully using the remaining employees. Virtual members are able to maintain a full production schedule to minimize idle time in their own companies. When economics

dictates the structure of a company and its resources, full use of all assets becomes very important to remain viable. In much the same way, a corps or JTF staff will fully use all deployed members and have greater access to information production resources through virtual members of the staff.

Changes made to the corps or JTF staff structure cannot reduce the functioning and current level of support given to a commander. A new structure would have to provide major benefits in several areas to make an attractive alternative. Access to more information and better analysis of that information might be the key to shifting the corps or JTF staff away from traditional structures and toward virtualness. It is unlikely this could be a total or even majority shift of functions. A corps must remain a robust headquarters functioning in a harsh environment of combat under all conditions.

What outcomes need to answer the original research question of "Can the functions of a Corps or Joint Task Force staff be accomplished by virtual organizations for the commander?" Some staff functions will easily convert to virtual organizations and still accomplish their tasks satisfactorily. Other staff functions will have to remain traditional organized and work with minimal outside interaction.

The Potential Outcomes

Gains in effectiveness for a particular staff section come from the ability to do their job better than before. Subjective reports from subordinate units, and reporting statistics for personnel actions could provide a method of measuring quality. For the G-1 and G-4, this means staying directly connected with the national system of replacements and supplies used during peacetime. For routine requests, this remains a positive measure for changing them. Special requests have always gone outside the normal chain of support.[80] For the G-2 and G-3 sections, intelligence links to specialized systems outside the normally available support offers a potential advantage over enemies. Improved knowledge about the enemy and indications of intentions could allow friendly forces to appear at unexpected locations or in strength that surprises the enemy and causes his defeat.

Extensive use of computers and information systems to distribute this knowledge within a corps can only represent a gain in efficiency. Faster and more open distribution allows subordinate commanders and their staffs access to raw intelligence products that affect their areas. Consequently, this may provide a significant gain in satisfaction for the subordinate units. Access to more

information relieves a concern for the higher commander as well, he can concentrate on the analysis of the data, rather than trying to find out if it was received.

Higher quality of staff products will remain harder to judge. With low turnover of staff positions and a high degree of training with the commanders, the staff will anticipate requirements. A high rate of turnover, or mass turnover, will set up waves with crests of excellence and troughs of lowered performance.[81] With a small deploying staff, backed by virtual organizations ready to respond with extended capabilities, the headquarters can gain control of their situation more quickly. Fewer people require reorientation from one mission to another and changes pass more easily in a small group. Within the staff, cohesiveness and morale should rise. All players become well known and poor performers can be isolated and removed.[82]

For the core headquarters staff that deploys to directly support a corps or JTF commander, trust builds from close working conditions. Common hardship and location will reinforce the socialization built at the home station. By leaving part of the staff behind and dealing with them directly for support, trust bonds remain in place. Subordinate units, suddenly deployed and working for a new higher headquarters, is a different matter. A commander

will retain his traditional role of introducing himself to the new units and visiting them. The flow of information from virtual corps modules to divisions will support a common perception of the mission and purpose.

Implications

It is technologically feasible to add virtual modules to the Army corps or even a multi-service joint task force staff. These modules could allow the staff to become a core organization to support the commander. They also multiply the capabilities of the present staff structure. Operation Desert Storm likely represents the beginning of modern technology used to observe the enemy and move information around the battlefield. Technology will also have direct consequences for the attack of enemy targets through faster decision making support for an attack.[83]

Evolutionary application of this capability to the old organizational structure does not exploit potential strengths to add to mission success. A force's adaptation to the situation must continue to consider the desired results and success criteria. Technology can allow a force to dominate a battlefield, but success still relies on the interpersonal action of people and their analysis and belief about the current situation.

Trust between individuals remains a dominate factor in applying the technological possibilities. The technology cannot lessen responsibilities for critical analysis of information for what it presents to the staff and commander. Within the socialization system at work, the Army depends heavily on the ability of commanders and their subordinates to conduct business face-to-face. This may eventually show itself as a downfall of reforming the current staff into virtual organizations.[84]

When formed with good results, virtual organizations in the Army enjoy immediate acceptance. There is little evidence of recognition of what has happened or seizure of the opportunity to repeat success. This type of departure from traditional hierarchical organizational structures is not appropriate for lower than the corps level of commander and staff. There is great potential for the further deliberate use of this type of organizational structure in a smaller Army with many commitments around the world.

Hierarchical Structure

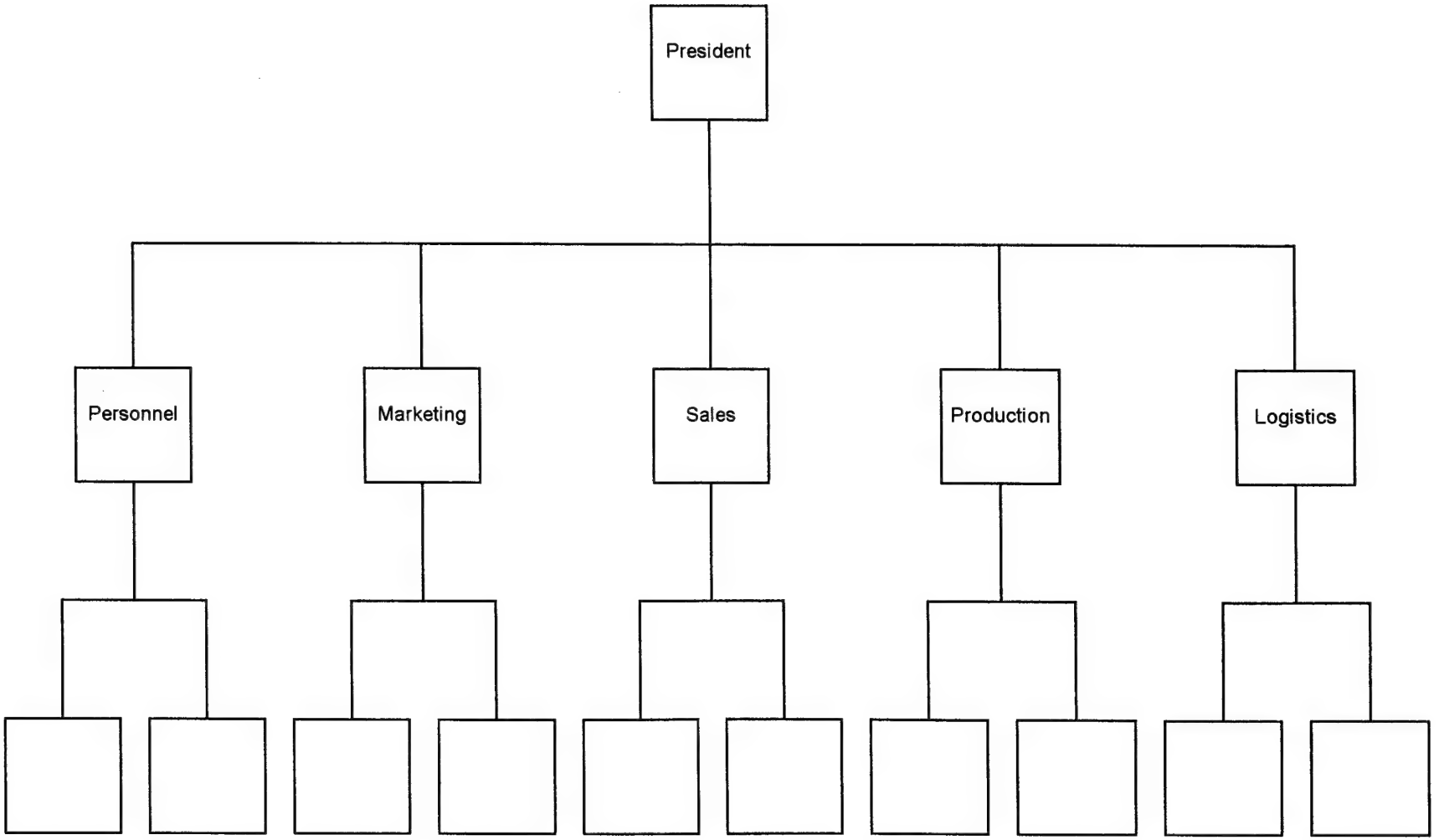

Diagram 1

Pure Project Structure

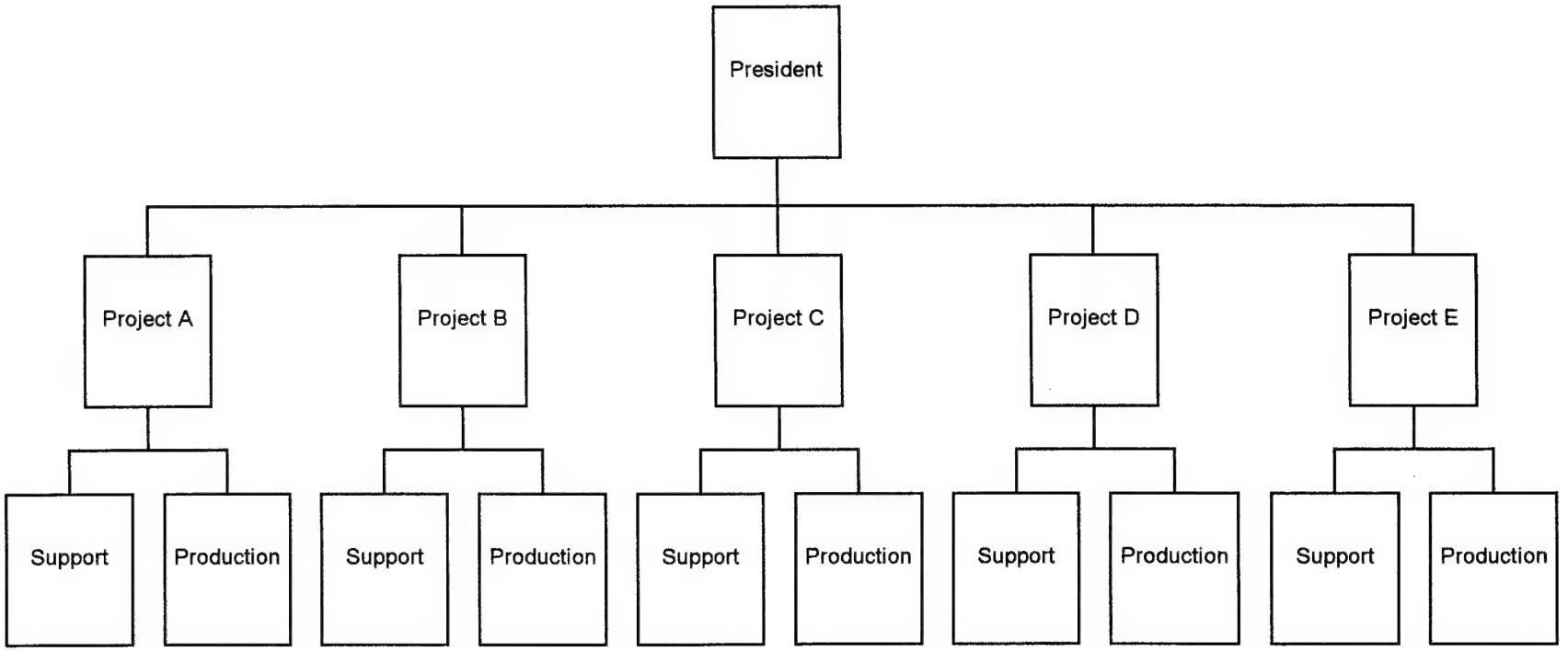

Diagram 2

Matrix Structure

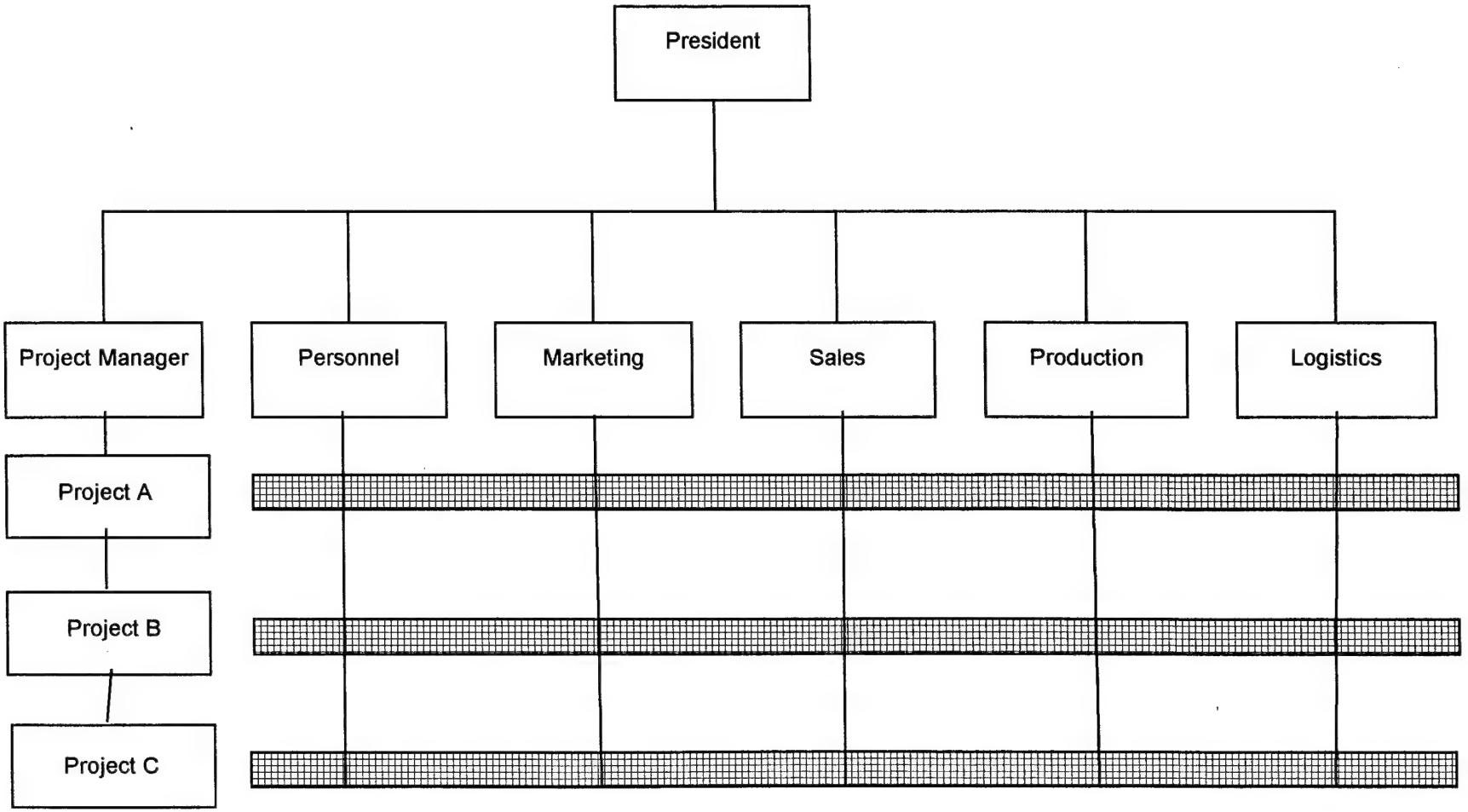

Diagram 3

Mixed Structure

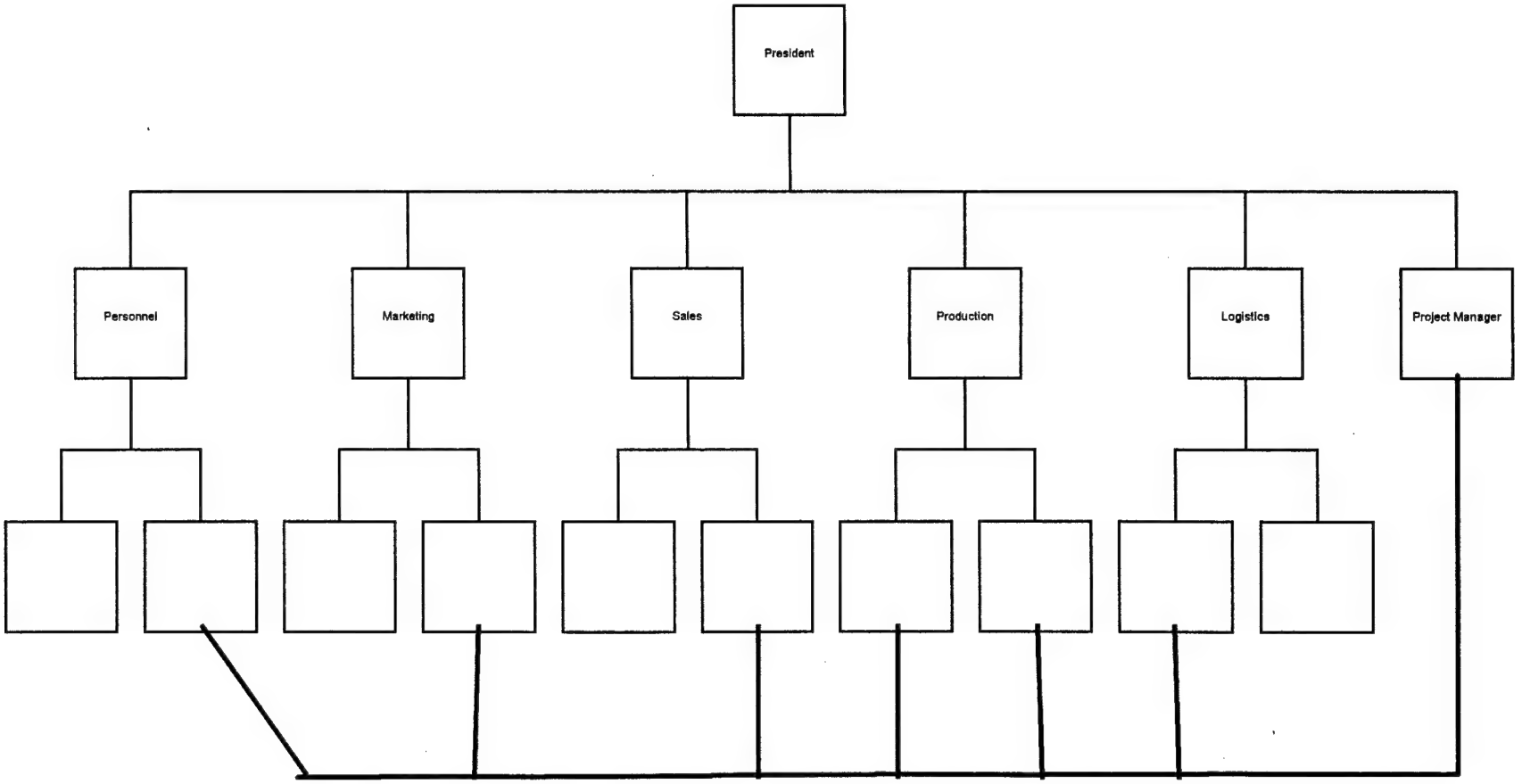

Diagram 4

Shamrock Structure

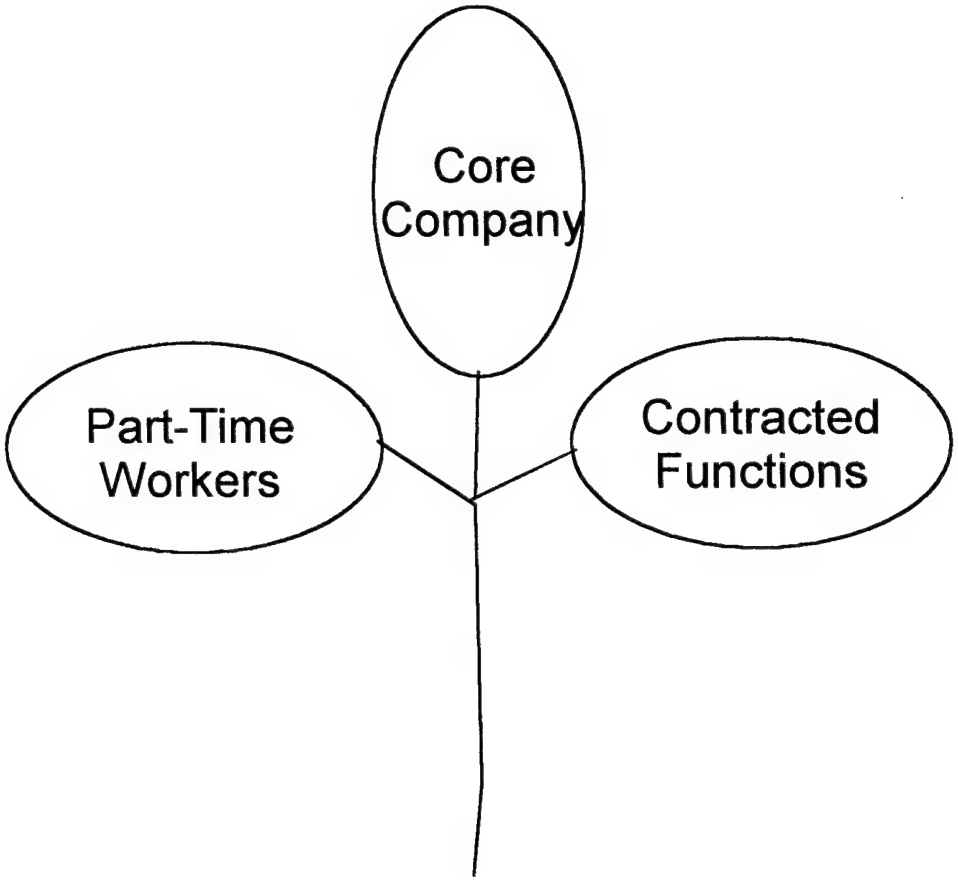

Diagram 5

ENDNOTES

1. Abbott, Edwin A. Flatland: A Romance of Many Dimensions. New York. HarperCollins Publishers, 1994. p. 71. The main character, a square, tries to explain the world of two dimensions to the King of Lineland, a world of one dimension.

2. Toffler, Alvin and Heidi. War and Anti-War: Survival at the Dawn of the 21st Century. New York. Little, Brown and Company, 1993. p. 9. The Toffler's postulate the Industrial Age as lasting from the mid 1600s until the middle 1980s. The start of the Information Age began shortly after World War II and is ongoing. The Industrial and Information Ages are labeled as the Second and Third Wave civilizations covered in their book.

3. Ibid., p. 19.

4. Bottoms, David. "Back to the Future," Industry Week. Vol. 243, Issue 18, October 3, 1994. p. 61.

Keough, Mark and Doman, Andrew. "The CEO as Organization Designer," The McKinsey Quarterly 1992. Number 2, Spring 1992. p. 12-13.

Ori, Joseph and Smith, Lynne R. "Independent Contractors Viewed as Growth Segment of the 90s," Pension World. Vol. 28, Issue 7, July 1992. p. 27.

Each of these references look at the late 1960s through early 1980s as a period of transition to new organizational structures. The necessity to survive during customer demands for high quality, low quantity products in a short period changed the market place.

5. Ori, Joseph and Smith, Lynne R. "Independent Contractors Viewed As Growth Segment of the 90s," Pension World. Vol. 28, Issue 7, July 1992. p. 26.

Champy, James. Reengineering Management: The Mandate for New Leadership. New York. HarperBusiness Publishers, 1995. p. 19. Champy's list of three waves of management change: 1) Exodus: reduce costs to stay in business; 2) Added value: finding the managers that don't contribute; and 3) Info movers: Middle managers who move information through a bureaucracy, technology can do it now. A subset of 3 is "reengineering," if you push responsibility down to the workers, do you need the manager? Managers look for ways to increase profits, maintain their own status and keep their accumulated resources.

6. Malone, M. and Davidow, W. "Virtual Corporation," Forbes. Supplement Issue, December 7, 1992. p. 102.

7. Nichiporuk, Brian and Builder, Carl. Information Technologies and the Future of Land Warfare. Santa Monica, Ca. Rand Arroyo Center, 1995. p. x.

8. Fukuyama, Francis. Trust: The Social Virtues and the Creation of Prosperity. New York. The Free Press, 1995. p. 23-25.

9. Abbott, Edwin A. Flatland: A Romance of Many Dimensions. New York. HarperCollins Publishers, 1994. p. 92. The square is pulled from his familiar surroundings in Flatland and compelled by a Sphere to look at existence in a new way.

10. Interview with Maj. Gen. (Rtd) Charles K. Heiden, 3 April 1996.

11. FM 101-5 (Final Draft), Command and Control for Commanders and Staff. Department of the Army, August 1993. p. 3-1.

12. Interview with Maj. Gen. (Rtd) Charles K. Heiden, 3 February 1996.

13. Interview with Maj. Gen. (Rtd) Charles K. Heiden, 3 April 1996. General Heiden went on to discuss the key to the corps gaining control of a situation is a clear definition of its mission and is tied to its ability to rapidly deploy, establish itself in the area of operations and to survive. He feels that for the future, whether in a Desert Storm like war or a Bosnia like operation, a secure information system allowing dispersed continuous command and control of the units is a necessity.

This also begins to look toward the issue of trust, as referenced early in Fukuyama's book Trust, between elements of a staff that may add personnel who are not normally part of the organization. With a smaller force, this augmenting a traditionally organized staff when deployed, plug-in modules of personnel could become a normal situation.

14. FM 101-5 (Final Draft), Command and Control for Commanders and Staff. Department of the Army, August 1993. p. 3-1.

15. Ibid., p. 3-69.

16. Ibid., p. L-17.

17. Ibid., p. 3-6 to 3-10.

18. Ibid., p. 3-10 to 3-15.

19. Ibid., p. 3-15.

20. The purpose of forming a Joint Task Force comes from the necessity to accomplish a mission beyond the abilities of a single service.

21. FM 101-5 (Final Draft), Command and Control for Commanders and Staff. Department of the Army, August 1993. p. 3-15 to 3-22.

22. Ibid., p. 3-22 to 3-25.

23. Joint Pub 0-2, Unified Action Armed Forces (UNAAF). 24 February 1995. p. IV-9.

24. Joint Force Air Component Commander Primer, 2nd Ed. HQ, USAF, Washington, D.C., February 1994. p. 1.

25. Ibid., p. 6.

26. Joint Pub 3-0, Doctrine for Joint Operations. 1 February 1995. p. IV-17. At this time, there is not a single clear document, like the JFACC Primer that describes the JFMCC functions and responsibilities.

27. Ibid., p. IV-17.

28. Joint Pub 6-0, Doctrine for Command, Control, Communications and Computer (C4) Systems Support to Joint Operations. 30 May 1995. p. II-4 and II-14.

29. Interview with Dr. Robin Conners, 6 March 1996. Dr. Conners is a business consultant and writer.

30. Abbott, Edwin A. Flatland: A Romance of Many Dimensions. New York. HarperCollins Publishers, 1994. p. 96-97.

31. Nichiporuk, Brian and Builder, Carl. Information Technology and the Future of Land Warfare. Santa Monica, Ca: Rand Arroyo Center, 1995. p. 28-29.

32. Fukuyama, Francis. Trust: The Social Virtues and the Creation of Prosperity. New York. The Free Press, 1995. p. 25. There is an underlying assumption in most of the business literature that the members of a virtual organization will operate honestly. This does not imply they submerge advocating their own interests, merely that information provided and pricing is truthful. No industrial espionage is conducted for later advantage in a rivalry. Much of this is not a problem for the military, though security of information and motives of individuals will always remain a concern.

33. Champy, James. Reengineering Management. New York: HarperBusiness, 1995. p. 9.

34. Interview with Maj. Gen. (Rtd) Charles K. Heiden, 3 February 1996.

35. Meredith, Jack and Mantel, Samuel Jr. Project Management: A Managerial Approach, 2d ed. New York: John Wiley & Sons, 1989. p. 112-115. This and the following diagrams are adapted from the book's illustrations.

36. Ibid., p. 115-117.

37. Ibid., p. 117-122.

38. Ibid., p. 122-124.

39. Nichiporuk, Brian and Builder, Carl. Information Technology and the Future of Land Warfare. Santa Monica, Ca: Rand Arroyo Center, 1995. p. 42-43.

40. Malone, M. and Davidow, W. "Virtual Corporation," Forbes, Dec 7, 1992, p. 104.

41. Ibid., p. 104.

42. Ibid., p. 105.

43. Ibid., p. 106.

44. Dyson, Esther. "The Virtual, Visible Corporation," Computerworld, Jan 30, 1995, p. 37.

45. Malone, M. and Davidow, W. "Virtual Corporation," Forbes, Dec 7, 1992, p. 106.

46. Ibid., p. 106-107.

47. Bottoms, David. "Back to the Future," Industry Week, Oct 3, 1994, p. 61.

48. Verity, John W. "A Company That's 100% Virtual," Business Week. Issue 3400, November 21, 1994. p. 85.

49. Keany, Thomas A. and Cohen, Eliot A. Gulf War Air Power Survey Summary Report. Washington, D.C.: U.S. Government Printing Office, 1993. p. 247-248.

50. Malone, M. and Davidow, W. "Virtual Corporation," Forbes, Dec 7 1992, p. 102.

51. Ibid., p. 106. The following is a full reproduction of Malone and Davidow's checklist:

"Product Development: Computer-aided design; computer simulation; heavy customer and supplier design input; linked design teams.

Product Manufacturing: Flexible manufacturing systems; computer-integrated manufacturing (only where practical); work teams; kaizen continuous improvement and just-in-time inventory; total quality control; on-site supplier participation; decentralized production and customer participation (where possible); products produced instantly in response to demand.

Virtual Products: High information content; continuously adaptive to user; heavy customer participation in production; serve (when possible) as a learning mode for subsequent products.

Channel Relationships: Co-destiny with suppliers, distributors and retailers; shared strategic and financial data; reduced supplier lists; dynamic, multiventuring (where practical); sole sourcing and 'reverse marketing' to suppliers; electronic data interchange; cross-investments; point-of-sale information tracking; distributor/retailer training.

Management: Reduced middle management; enlarged spans of control; broadband MIS; greater delegation of decisionmaking to line workers; outcome (not task) organization; participative management; revised reward system and reduced perquisites of power; the CEO as premier generalist/visionary/communicator.

Employees: Continuous training and the worker as 'learner'; use of work teams; continuously changing job descriptions; performance rewards; increased decisionmaking powers and responsibility for customer relations; greater job security and reduced transferability of skills to new employees.

Organizations: Flatter, edgeless; on-site employees of suppliers and distributors; more centralized management for the few remaining staff positions; in-house 'universities' for training."

52. Nichiporuk, Brian and Builder, Carl. Information Technology and the Future of Land Warfare. Santa Monica, Ca: Rand Arroyo Center, 1995. p. xi.

53. Ibid., p. xi.

54. Guthrie, Samuel A. Knowledge-Based Operations: The "So-What" of Information Warfare. SAMS Monograph, School for Advanced Military Studies, Command and General Staff College, Fort Leavenworth, KS., 2d Term, AY 94-95. p. 25-27.

55. Abbott, Edwin A. Flatland: A Romance of Many Dimensions. New York. HarperCollins Publishers, 1994. p. 105.

56. Meredith, Jack and Mantel, Samuel Jr. Project Management: A Managerial Approach, 2d ed. New York: John Wiley & Sons, 1989. p. 553-564. This book portion is used as the basis for a following discussion on how they affect the Army.

57. Field Manual 25-100, Training the Force. Washington, D.C.: HQ Department of the Army, 1988. p. 1-6 to 1-7. "They [senior leaders] mentor, guide, listen to, and 'think with' subordinates to challenge their depth of knowledge and understanding. Senior leaders share experienced insights that encourage subordinates to study their profession and develop themselves."

58. Heiden, Charles K., Maj. Gen. (Rtd), interviews and conversations during December 1995 to March 1996.

59. Within the author's personal experience has been the transition from the company clerk to handle administrative paperwork, to the consolidated personnel action center at battalion to the issue of a laptop computer to the company first sergeant. Over the period of several years that this transition took place, the personnel devoted to administration in a battalion also declined.

60. Field Circular 71-6, Battalion and Brigade Command and Control. Washington, D.C.: HQ Department of the Army, 1985.

Field Manual 71-123, Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company Team. Washington, D.C.: HQ Department of the Army, 1992. 1-1 to 1-46.

The former manual was one of the first formal attempts to publish what command posts should be doing to assist the commander. The latter manual shows the relationships of three levels of tactical command. They detail the setup of a command post and the tracking of information. The tactical operations center has become a focal point of information for commanders. Traditionally this center tracked the tactical operation, but has also begun to include the logistics status of the unit and evaluations of effects on the unit. More functions of the idea of main and rear command posts are becoming blended with better information accuracy and availability.

61. Handy, Charles. The Age of Paradox. Boston: Harvard Business School Press, 1994. p. 34-35. This section discusses the need of businesses to be rigid and flexible, delegating and controlling, and other paradoxes to operate successfully.

62. Field Manual 25-100, Training the Force. Washington, D.C.: HQ Department of the Army, 1988. p. 1-5. These good habits of clearly expressing what is to be done in training transfer into combat orders easily.

63. Slim, Viscount. Defeat Into Victory. New York. Papermac, 1987. p. 114, 132, 167. Viscount Slim stands in contrast as a leader against this type of practice. When moved among the various commands in India-Burma during World War II, he worked with the officers assigned, rather than cut the brain out of the old organization to form the new.

64. Hence the need for companies that downsize too severely to gain temporary profitability to rehire the same jobs back. Worst cases have seen companies hire back the same workers as consultants at a higher cost. The military evidences this by forcing retirements on members who then are hired by companies whose exclusive business is consulting on military projects. If a general officer on active duty would earn around $53 per hour, the retired consultant general can often earn $100 per hour or more.

65. Fukuyama, Francis. Trust: The Social Virtues and the Creation of Prosperity. New York. The Free Press, 1995. p. 149-150.

66. Computers have become more prevalent within the past several years. They are used to track unit information, exchange orders over local area networks, send graphics, conduct video conferences and compute combat power of units, to list a few functions. Simple computer war games are available to units for use in pre-deployment planning with varying degrees of accuracy and battle representation, examples include JANUS and WARSIM. Computer aided training devices include the Close Combat Tactical Trainer, the Battle Command Training Program and even the Combat Training Centers.

67. As demonstrated in various comments from BCTP senior observers and other participants in planning exercises during the SAMS curriculum.

68. Most large headquarters, battalion and larger, operate in three distinct units. A rear command post that orients on logistics and security of its assigned area around logistics facilities. A main command post that orients on planning and operations behind the immediate area of enemy contact. A forward command post, and/or command group, that orients on the immediate battle with the enemy. Sometimes the rear and main command posts are combined at a single location. In any event, to achieve unity of effort and an integrated plan for the whole unit, planners co-locate to facilitate and speed the planning process.

69. An example of this incompatible data exchange is the Army's Intra-Vehicular Information System (IVIS) and the Navy's LINK system. Both provide excellent situational awareness for the users, but they cannot communicate directly. Within the Army, several different command and control systems are under development. Communication between them is difficult, at best, though work continues to improve their ability to exchange information.

70. Walsham, Geoff. "Virtual Organization: An Alternative View," Information Society. Vol. 10, Issue 4, Oct/Dec 1994. p. 291.

71. An example of reducing the required clerks for processing are the new military identification cards with a bar code strip on the back. By scanning the information, a database entry could be established to draw any information required about an individual. It would also establish or alter pay, promotion, skill or medical status with minimal human interaction, less manual corrections.

72. Non-attributable comment from a recent SAMS augmentation to BCTP. The player unit put the operations order, maneuver sketches and overlays on their tactical local area network (LAN). Unfortunately, the system was not set up to alert subordinate units of the publication. It also could not allow multiple simultaneous accesses by units to the material. This meant an eight to twelve hour delay while units downloaded the material without any priority of need. The player unit found it faster to send a single courier with paper copies to every subordinate player units, rather than wait for file downloading to take place from the LAN.

73. Non-attributable comments during the BCTP seminar given for the School for Advanced Military Studies, 20-29 March 1996. Within the Battle Command Training Program (BCTP), this phenomenon has become more prevalent in recent years. The BCTP observers attribute this to commanders wanting to wait just a little longer to get another piece of information to complete the picture of enemy actions.

74. The blending of two nominally separate, but intimately linked staffs begins to erase formal boundaries. As they link together in a co-destiny relationship, each dependent on the other for success, they become essentially edgeless through their working together.

75. Atkinson, Rick. Crusade, The Untold Story of the Persian Gulf War. New York. Houghton Mifflin Company. 1993. p. 509. The most often cited figure for complete deployment for Operation Desert Shield/Storm is six months for the entire U.S. military force.

76. A slight variant of the knowledge based team concept was used by the author as the Chief of Plans, Operations Group, National Training Center, Fort Irwin, Ca. Two man plans teams would conduct all planning for a rotation, then augment the operations team (a chief, three shift officers and four or five NCOs) for the entire rotation. The team issued all orders assisting the observer-controllers and division commander with decision making and subsequent consequences. With three plans teams, each had ample time to perform planning and coordination for their next augmentation.

77. Tilly, Phillip R. A Recommendation for the Heavy Division Command Group. Master's Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, Ks., June 1994. This thesis deals with the personal decisions of five

division commanders in configuring their command groups and tactical command posts to fit their own preferences and needs for Desert Storm. Inherent in the thesis is the implication that commander's will continue to mold the organization to fit their own needs.

78. Perhaps the most recent example was the ceiling assigned to the deployment in Bosnia-Herzogovinia at 20,000. This number bore little consideration for a heavy division with the required supporting units from the parent corps or a JTF headquarters equipped for multi-national operations in an austere theater.

79. Abbott, Edwin A. Flatland: A Romance of Many Dimensions. New York. HarperCollins Publishers, 1994. p. 117.

80. Hence the establishment of the "Desert Express" regular aircraft flights from the U.S. through Germany to run critical supplies and/or personnel to the deployed units in Saudia Arabia during Desert Shield/Storm. Other historical examples abound from Vietnam, Korea and World War II as commanders on the spot made decisions to get required supplies to units that needed them.

81. Field Manual 25-100, Training the Force. Washington, D.C.: HQ Department of the Army, 1988. p. 1-4 to 1-5.

82. Szilagyi, Andrew Jr and Wallace, Marc Jr. Organizational Behavior and Performance, 5th ed. New York: HarperCollins, 1990. p. 726. The outcomes for the staff are based on how the authors judged changing an organizational structure. They looked for the following factors in performance: satisfaction of the commander and the subordinate units; lower turnover in staff positions; goal achievement (quality of products); adaptability of the staff to a situation; cohesiveness/morale of the staff.

83. As shown in the Operation Desert Storm example cited earlier. Movement of strategic information has been held as closely guarded secrets to avoid revealing capabilities to the enemy. The publication of U-2 photographs of Cuban missile sites, the Ultra code breaking and even the Walker spy case are recent historical cases of strategic capabilities withheld from local commanders.

84. Fukuyama, Francis. Trust: The Social Virtues and the Creation of Prosperity. New York. The Free Press, 1995. p. 357-359. "Rational desire corresponds, more or less, to the rational utility maximization of neoclassical economics: the endless accumulation of material possessions to satisfy an ever-increasing set of wants and needs."

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